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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/600,931	07/21/2000	KOJI YAMAMOTO	362-43PCT/U	2670

23869 7590 09/19/2002

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EXAMINER

LEE, EUGENE

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 09/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/600,931

Applicant(s)

YAMAMOTO ET AL.

Examiner

Eugene Lee

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-13,15 and 16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-6,8-13,15 and 16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 thru 6, 8 thru 13, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain '423 in view of Shiue et al. '088. Jain discloses (see, for example, FIG. 13) a damascene interconnection comprising a conductor-filled trench (interconnection trench) 64 and insulating pillars (protrusions) 50. FIG. 10 shows a plan view of a pillared landing pad (pad trench) 55 where multiple protrusions are dispersed throughout.

FIG. 6 shows the damascene interconnection formed by a patterned insulating layer 22 over a substrate 20. Conducting segments (conductive film) 32, 44 and 46 lie between insulating pillars 38. In column 5, lines 34-45, Jain states that the incorporation of insulating pillars divides a wider conductor and, hence, minimizes dishing.

Jain does not disclose a contact hole formed within said pad trench to electrically connect said conductive film to a further conductive film formed below said insulating film, wherein said contact hole and said further conductive film substantially suppress an increase in electrical resistance in said pad trench due to formation of said protrusion. However, Shiue shows (see, for example, FIG. 3) a bond pad structure comprising a third metal pad 30, second via plugs (contact hole) 36, and a second metal pad (further conductive film) 32. The third metal pad is connected to the second metal pad through the second via plugs. In the abstract, Shiue teaches that reliable

interconnections are provided between the bond pad structure and the next level of integration. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to include these second via plugs and second metal pad in Jain's invention in order to connect the conducting segments of Jain's invention to a further integration within the substrate.

Regarding the limitation "substantially suppress an increase in electrical resistance in said pad trench due to formation of said protrusion", it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations.

Regarding claims 4 and 11, see FIG. 3 and element 38. Also, in column 6, lines 45-53, Jain states that many other insulating patterns may be construed that produce the same effect (i.e. reducing dishing by the narrowing of wide trenches).

### ***Response to Arguments***

3. Applicant's arguments filed 6/17/02 have been fully considered but they are not persuasive. The new limitation "at a position near said protrusion" does not differentiate the applicant's invention from Jain in view of Shiue. In FIG. 6 of Jain, when a contact hole is formed underneath conducting segments 32, 44, 46, the contact hole will form near the insulating pillars (protrusions) 38. Therefore, the Examiner does not see how the new limitation differentiates the claimed invention from Jain in view of Shiue.

The Shiue reference is only being used to show that interconnections can be made from a metal pad to a lower metal pad. Therefore, **the metal pad 30 in Shiue is analogous to the conducting segments 32, 44, 46 of Jain which is also a metal pad.** The Shiue reference is

Art Unit: 2815

simply showing that a metal pad may be connected to a lower metal layer (by way of contact holes) in order to accommodate further integration. The idea that the metal pad of Shiue should also be formed of conducting segments (instead of one whole metal layer) and have protrusions is irrelevant since the applicability of Shiue reference is based on whether a metal pad can be connected to a lower metal pad by contact holes, which Shiue clearly shows.

### **INFORMATION ON HOW TO CONTACT THE USPTO**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 703-305-5695. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 703-308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Eugene Lee  
September 9, 2002



EDDIE LEE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800